PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Luc Francois DESCAMPS, et al. Attorney Docket Q62126

Appln. No.: Group Art Unit:

Filed: December 21, 2000 Examiner:

For: METHOD AND APPARATUS FOR DETERMINING PROPERTIES OF A TRANSMISSION CHANNEL

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Page 1, after the title, insert the heading --Background of the Invention--.

Page 1, after line 20, insert the heading --Summary of the Invention--.

Page 4, after line 2, insert the heading --Brief Description of the Drawings--.

Page 4, paragraph beginning at line 11, amend to show as follows:

figures 3a and 3b show an example of pulses generated by the equipment represented on figure 2, and

Page 4, paragraph beginning at line 13, amend to show as follows:

figures 4a through 4f, figures 5a through 5f, figures 6a through 6f, and figures 7 and 8 are diagrams showing signals at different locations on the receiving side of the equipment represented on figure 2.

Page 4, after line 14, insert the heading --Detailed Description of the Invention--.

IN THE CLAIMS:

Please enter the following amended claims:

4. (Amended) A method according to claim 1, characterized in that each generated pulse is provided with a given amplification (48) or attenuation and the received pulses are provided with the corresponding attenuation (50) or amplification.

5. (Amended) A method according to claim 1, characterized in that the signals received are subjected to a synchronous averaging (52).

6. (Amended) A method according to claim 1, characterized in that the received signals are subjected to a matched filtering (54).

7. (Amended) A method according to claim 1, characterized in that the received signals are subjected, at least for the medium and high frequency pulses, to a noise suppressing step (56) comprising the estimation of the noise for the part of the received signal after the channel end echo and the determination of a threshold above which the signals are taken into consideration.

8. (Amended) A method according to claim 1, characterized in that the received signals are processed in their own frequency bands and added (60) after processing.

10. (Amended) A method according to claim 1, characterized in that the pulses are complex analytical pulses.

11. (Amended) A method according to claim 1, characterized in that the frequency bandwidth and the amplitude of the low frequency pulses (40) are selected according to the channel attenuation and its compliancy in terms of egress.

12. (Amended) A method according to claim 1 characterized in that the pulses are generated sequentially or simultaneously.

13. (Amended) A method according to claim 1 wherein at least one of said properties being determined comprises the locations of defects of the channel.

14. (Amended) A method according to claim 1 wherein said transmission channel comprises a telephone line between a central office (12) and a subscriber (14), the measurement being made at the central office.

15. (Amended) A method for testing the properties of telephone lines comprising copper pairs, between a central office and a subscriber, characterized in that it comprises using time domain reflectometry to test said properties.

16. (Amended) A method according to claim 15, characterized in that the time domain reflectometry step comprises the steps of generating, at one end of the channel, a plurality of pulses (40, 42, 44) covering different frequency bands, and detecting echoes provided by these pulses at the same end (12) of the line.

17. (Amended) An apparatus for testing the properties of telephone lines comprising copper pairs, between a central office and a subscriber, characterized in that it comprises time domain reflectometry test circuit.

18. (Amended) An apparatus according to claim 17, characterized in that said time reflectometry test circuit comprises a pulse generator generating a plurality of pulses at one end of the line covering different frequency bands, and an echo processor processing the echoes provided by these pulses at the same end (12) of the channel.

19. (Amended) An apparatus according to claim 18, characterized in that the different frequency bands are overlapping.

20. (Amended) An apparatus according to claim 19, characterized in that said echo processor processes the reflected pulses such that the frequency spectrum is practically flat after reflection and processing.

21. (Amended) An apparatus according to claim 18, characterized in that the pulse generator includes, amplification or attenuation for each generated pulse and in that said apparatus includes complementary attenuation or amplification for each received pulse.

22. (Amended) An apparatus according to claim 18, characterized in that it comprises a synchronous averager for the received signals.

23. (Amended) An apparatus according to claim 18, characterized in that it comprises a matched filter for the received signals.

24. (Amended) An apparatus according to claim 18, characterized in that it comprises a noise suppressor for the received signals, the noise including an estimator estimating the noise for part of the received signals after the channel end echo and threshold circuit determining a threshold above which the signals are taken into consideration.

25. (Amended) An apparatus according to claim 18, characterized in that it comprises a processor processing the received signals for each frequency band and an adder adding the processed signals.

26. (Amended) An apparatus according to claim 25, characterized in that it comprises a detector detecting the modulus of the received signals and/or the variation with time of the frequency of the received signals.

27. (Amended) An apparatus according to claim 18, characterized in that it comprises a receiver receiving complex analytical pulses.

28. (Amended) An apparatus according to claim 18, characterized in that it comprises a selector selecting the frequency bandwidth and the amplitude of the low frequency pulses according to the line attenuation and its compliancy in terms of egress.

29. (Amended) An apparatus according to claim 18 characterized in that said pulse generator generates the pulses sequentially or simultaneously.

21. (Amended) An apparatus according to claim 18, characterized in that the pulse generating means comprise, for each generated pulse, amplification (48) or attenuation means and in that on the received in side, it comprises, for each pulse, complementary attenuation (50) or amplification means.

IN THE ABSTRACT:

Please delete the present Abstract of the Disclosure and replace it with the following new Abstract of the Disclosure.

ABSTRACT

The invention concerns a time domain reflectometry method for estimating properties of a transmission channel, for instance a channel for transmitting electric or acoustic signals. This method includes the steps of generating, at one end of the channel, a plurality of pulses (40, 42, 44) covering different frequency bands, and processing the echoes provided by these pulses at the same end of the channel. The frequency bands of the generated pulses are preferably overlapping. The invention is particularly applicable to the testing of ADSL services.

PRELIMINARY AMENDMENT
Attorney Docket Q62126

REMARKS

Entry and consideration of this Amendment is respectfully requested.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 4,paragraph beginning at line 11, amend to show as follows:

[figure 3] figures 3a and 3b show[s] and example of pulses generated by the equipment represented on figure 2, and

Page 4,paragraph beginning at line 13, amend to show as follows:

[figures 4 to 8] figures 4a through 4f, figures 5a through 5f, figures 6a through 6f, and figures 7 and 8 are diagrams showing signals at different locations on the receiving side of the equipment represented on figure 2.

IN THE CLAIMS:

The claims are amended as follows:

4. (Amended) A method according to [any of claims 1-3] claim 1, characterized in that each generated pulse is provided with a given amplification (48) or attenuation and the received pulses are provided with the corresponding attenuation (50) or amplification.

5. (Amended) A method according to [any of the previous claims] claim 1, characterized in that the signals received are [submitted] subjected to a synchronous averaging (52).

6. (Amended) A method according to [any of the previous claims] claim 1, characterized in that the received signals are [submitted] subjected to a matched filtering (54).

7. (Amended) A method according to [any of the previous claims] claim 1, characterized in that the received signals are [submitted] subjected, at least for the medium and high frequency pulses, to a noise suppressing step (56) comprising the estimation of the noise for the part of the received signal after the channel end echo and the determination of a threshold above which the signals are taken into consideration.

8. (Amended) A method according to [any of the previous claims] claim 1, characterized in that the received signals are processed in their own frequency bands and added (60) after processing.

10. (Amended) A method according to [any of the previous claims] claim 1, characterized in that the pulses are complex analytical pulses.

11. (Amended) A method according to [any of the previous claims] claim 1, characterized in that the frequency bandwidth and the amplitude of the low frequency pulses (40) are selected according to the channel attenuation and its compliancy in terms of egress.

12. (Amended) A method according to [any of the previous claims] claim 1 characterized in that the pulses are generated sequentially or simultaneously.

13. (Amended) [Application of the] A method according to [any of the previous claims to the determination of] claim 1 wherein at least one of said properties being determined comprises the locations of defects of the channel.

14. (Amended) [Application of the] A method according to [any of claims 1-12 to the properties of] claim 1 wherein said transmission channel comprises a telephone line between a central office (12) and a subscriber (14), the measurement being made at the central office.

15. (Amended) A method for testing the properties [, such as the attenuation,] of telephone lines comprising copper pairs, [for instance twisted pairs,] between a central office and a subscriber, characterized in that it [makes use of the] comprises using time domain reflectometry to test said properties.

16. (Amended) A method according to claim 15, characterized in that the time domain reflectometry step comprises the steps of generating, at one end of the channel, a plurality of pulses (40, 42, 44) covering different frequency bands, and [of] detecting [the] echoes provided by these pulses at the same end (12) of the line.

17. (Amended) An apparatus for testing the properties [, such as the attenuation,] of telephone lines comprising copper pairs, [for instance twisted pairs,] between a central office and a subscriber, characterized in that it comprises time domain reflectometry [means] test circuit.

18. (Amended) An apparatus according to claim 17, characterized in that [it] said time reflectometry test circuit comprises [means for generating,] a pulse generator generating a plurality of pulses at one end of the line [, a plurality of pulses (40, 42, 44)] covering different frequency bands, and [means for] an echo processor processing the echoes provided by these pulses at the same end (12) of the channel.

19. (Amended) An apparatus according to claim 18, characterized in that the [means for generating a plurality of pulses covering] different frequency bands are [such that the frequency bands are] overlapping.

20. (Amended) An apparatus according to claim 19, characterized in that [it comprises means for processing] said echo processor processes the reflected pulses such that the frequency spectrum is practically flat after reflection and processing.

21. (Amended) An apparatus according to [any of claims 18-20] claim 18, characterized in that the pulse [generating means comprise for each generated pulse] generator includes, amplification [(48)] or attenuation [means] for each generated pulse and in that [on the received in side, it comprises, for each pulse,] said apparatus includes complementary attenuation [(50)] or amplification [means] for each received pulse.

22. (Amended) An apparatus according to [any of claims 18-21] claim 18, characterized in that it comprises a synchronous [averaging means] averager for the received signals.

23. (Amended) An apparatus according to [any of claims 18-22] claim 18, characterized in that it comprises a matched [filtering means (54)] filter for the received signals.

24. (Amended) An apparatus according to [any of claims 18-23] claim 18, characterized in that it comprises a noise [suppressing means (56)] suppressor for the received signals, [these] the noise [sup-pressing means] including [means for] an estimator estimating the

noise for [the] part of the received signals after the channel end echo and [means for] threshold circuit determining a threshold above which the signals are taken into consideration.

25. (Amended) An apparatus according to [any of claims 18-24] claim 18, characterized in that it comprises [means for] a processor processing the received signals for each frequency band and [means for] an adder adding the processed signals.

26. (Amended) An apparatus according to claim 25, characterized in that it comprises [means for] a detector detecting the modulus of the received signals and/or the variation with time of the frequency of the received signals.

27. (Amended) An apparatus according to [any of claims 18-26] claim 18, characterized in that it comprises [means for] a receiver receiving complex analytical pulses.

28. (Amended) An apparatus according to [any of claims 18-27] claim 18, characterized in that it comprises [means for] a selector selecting the frequency bandwidth and the amplitude of the low frequency pulses according to the line attenuation and its compliancy in terms of egress.

29. (Amended) An apparatus according to [any of claims 18-28] claim 18 characterized in that [it comprises means for generating] said pulse generator generates the pulses sequentially or simultaneously.